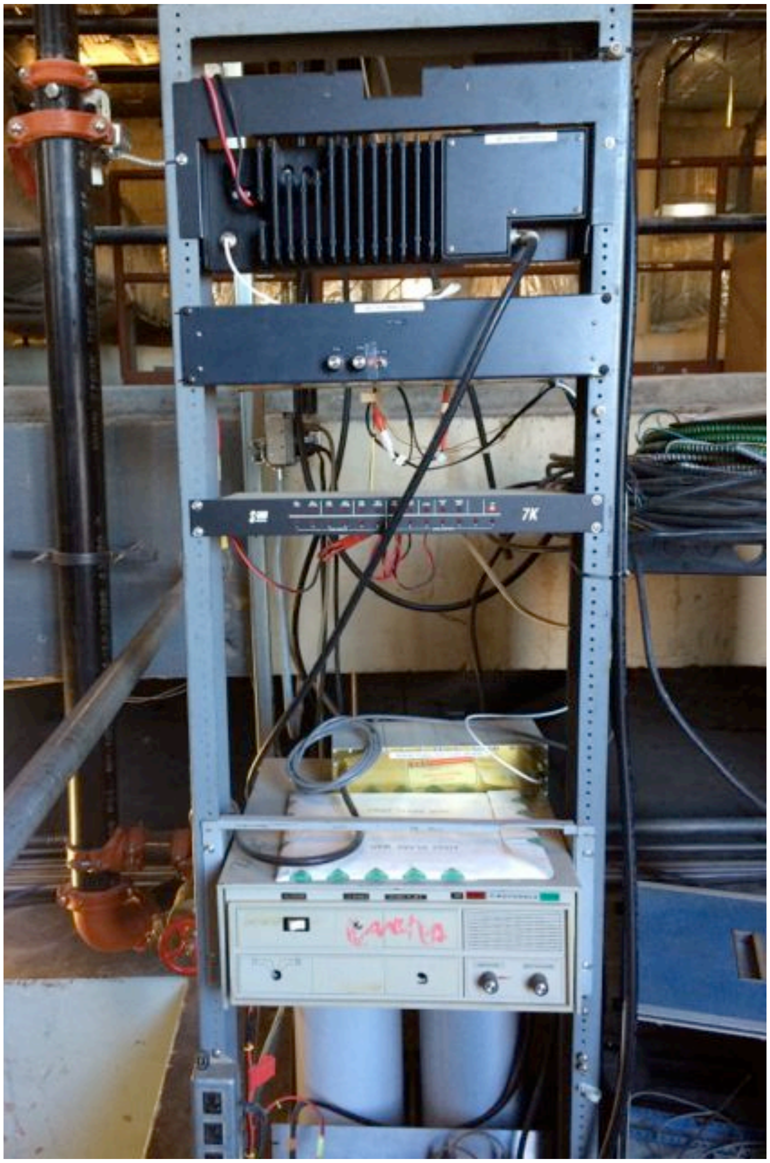
WARS Repeater Information

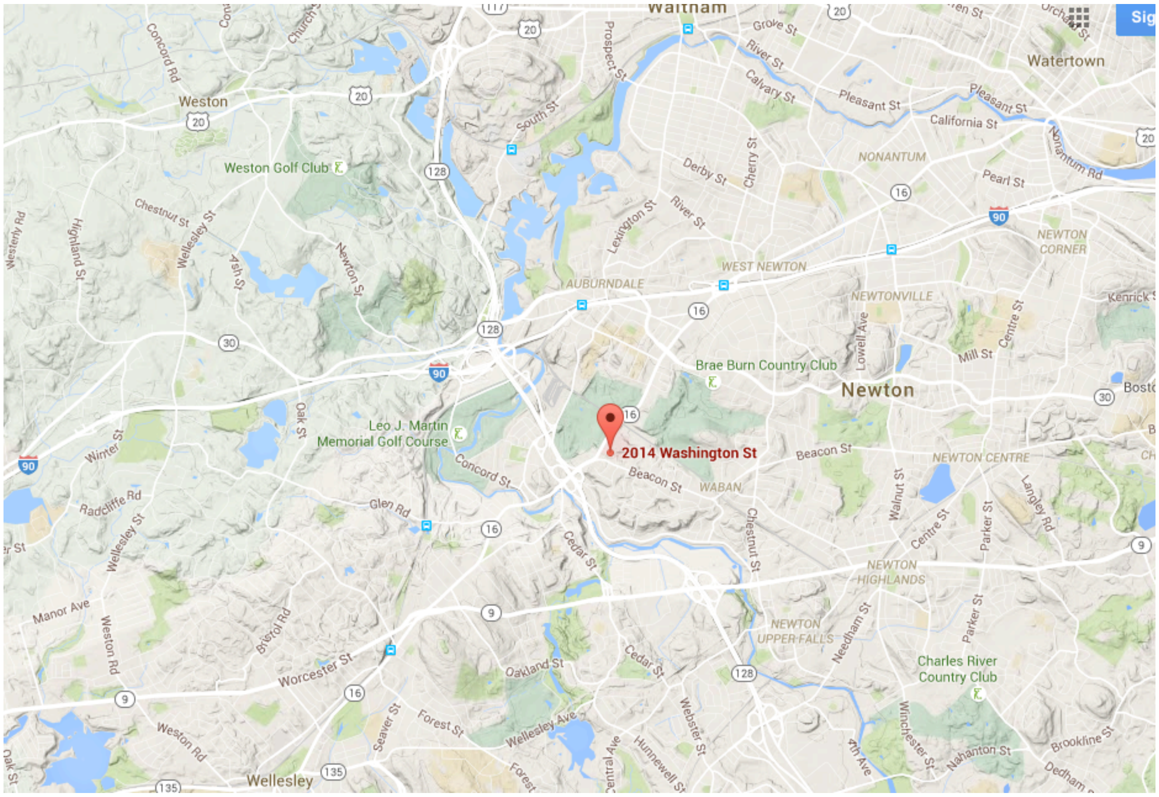
Based on Talk given by Bruce, KC1US, who maintained the system for many decades. A big "Thank You!" for his effort. Updated in 2008 and 2015.

A "hidden club asset" that many members do not use. Maintenance often goes "thankless" as the results of work are often not seen or heard. System consists of 2 independent repeaters, linked by a controller, other support gear.



The W1TKZ repeater system. On top is the 2M PA, then the 2M repeater. Below is the controller. The gold box is the receive bandpass filter. The grey box is the 440 repeater.

Coverage is limited by nearby topography, the repeater is in a valley, hills nearby: https://www.google.com/maps/place/2014+Washington+St,+Newton,+MA+02462/@42.3306311,-71.2486305,13z/data=!4m2!3m1!1s0x89e383b4010d17ad:0x29d29ba2457606d6!5m1!1e4



Location:

Co-located atop the Newton Wellesley hospital (42-20-12.3 N, 071-13-08.2 W). Antennas located at 210 feet above sea level. Height above average terrain ("HAAT") is 28.9m (Newton lower falls).

Repeater is in the penthouse on top of the 6th floor. The penthouse is a room with air handling equipment and other radio gear. Noisy and dusty, but heated with full time emergency power.

"RF City" in this neighborhood with many FM broadcast and TV nearby, as well as radio paging and two-way radio systems at the hospital. Many transmitters on the roof of the hospital (14 registered), especially a paging transmitter at 152.600 MHz about 20 feet away that has caused us grief.

Our antennas on the roof of the penthouse.

2M VHF:
147.030 output, 147.630 in (+600khz split), PL 123Hz.
Originally put on the air after our assisting NWH during the blizzard of ’78. Originally a split system with the receiver on Magus hill and linked via UHF.

1985 the repeater was a Kendecom Mark 3 plus transmitter, receiver and controller in one box. Had an external power amp to make 70 watts.

In April 2010 a new repackaged Motorola MSR 2000 (“Mitrek”), built by Lou Harris, N1UEC with an external Mitrek 30 amp power supply and 100 watt RF PA. Center card is an audio card from a Micor.

Antennae:
There are two Austin Antenna monoband co-linears, one for 2m and one for 440. 20 feet in length with 5.2dBi gain and a 17-degree pattern. Model APC-1363 for two meters.

Other repeaters on 147.030:
Bar Harbor, Walpole, Ossippee, Dalton, Levittown, Portland, Bethel.
Sometimes the “band opens” and we can hear these other repeaters. So a 123Hz PL tone detector at the repeater receiver output was added to eliminate intermod and other repeaters from passing through our system.

DCI 146-4H 2m band-pass filter added in January 2010 ahead of the receiver input to reject a nearby paging transmitter.

2M Duplexer:
Wacom WP-641 duplexer for 147.030MHz transmit and 147.630MHz receive. Duplexers are used to allow a single antenna be used by the repeater’s transmitter and receiver at the same time. Prevents the transmitter from overloading the receiver by the use of s deep notch.

UHF system:
444.600 out, 449.600 (+5Mhz split) in PL 88.5hz
The UHF system is a Mitrek modified by Lou Harris with an NHRC-4 Repeater Controller. A commercial radio with it’s own controller.

The previous repeater was a Hamtronics system built by N1CPE, N2AWG, KC1PR, N1EYZ and NT1L. Ran 10 watts, then 2 watts. Used until May 2002.

Duplexer:
Motorola T-1500. Passes , rejects

Antenna:
Austin Antenna APC-4067. 16 feet in length, 9.3dBi gain with a 7 degree pattern.

Controller:
S-COM 7K, installed in 2000, has a programmable system with a scheduler, multiple timers, audio coss-point switch, tone generators and speech encoder. CPU is a 6809 with 128kb of control memory. No longer manufactured. Newer and more capable controllers now exist.

This unit controls normal repeater functions: carrier detect, ID cycles, timeout, linking between 2m and 440.
Schedules: Daily, weekly, monthly, yearly.
Additional features: Messages, day, night, net modes, announcements, time of day and linking.

When the controller was changed for 2 meters, this was connected into the second S-COM controller port.

Linking: Difficulty in balancing the two audio paths and tone generators.
Timeout is not set to 2 minutes. Should wait for the beep tone before transmitting.

System costs:
Radios: 1,800.00
Power amp: 600.00
Duplexer: 900.00
Antenna: 525.00
Controller: 800.00
Coax: 200.00
Misc: 300.00
Total: $5,125.00

Legalities:
Repeaters in this area are coordinated via the New England Spectrum Management Council (NESMC).
Repeater Trustee: Tom N1CPE. He maintains the FCC license. Up for renewal on 08/11/2018.

Users:
WARS Wednesday Net. Sunday Needham net, Boston Marathon, Wellesley Parade, Walk for Hunger, Needham Emergency Management, Run for the Charles, general rag-chews.

Work to be done:
Update site info sheet.
Repair 2M 123Hz PL hum".
Try installing audio compressor in path to better control receive levels of various users.
Repair "crackles". May be local RFI or our antenna.
Move system into new Middle-Atlantic Rack. Buy locking door, shelving and power strip.
Sweep and touch up tuning on duplexers.
Research possible improvements to 2m receive range. Preamp, filters, or other.

Web sites for further reading:
www.nesmc.org
http://rptr.amateur-radio.net
www.nerepeaters.com
www.cdi2.com/build_it
http://www.nhrc.net
http://www.repeater-builder.com/motorola/msr2000/msr2000-index.html
http://www.rfwiz.com/AustinAntenna/AustinAntennaAPC_Series.htm
http://www.nhrc.net/nhrc-4/index.php

http://www.scomcontrollers.com/new/?q=node/15
Dave Maciorowski, WA1JHK
Bob Schmid, WA9FBO
S-COM Industries
PO Box 1718
Loveland, CO
80539-1718
970-663-6000

Lou Harris N1UEC
http://www.n1uec.org/n1uec/index.html
n1uec@n1uec.org
508-333-5714 (cell)
Walpole, MA

TS32 pl filter output not going anywhere?
Mitrek mobile.

Control PL tone for Scom?

TI062 card de-emphasis or level buffer. Also feeds scom controller.

From a paper handout and talk by KC1US in 2005?
Dan W1DAN 05/2008
Updated 09/2015